SERVICE EDGE

The Laser Printer Tech Quarterly
from Liberty Parts Team

Spring 2014

ARTICLES:

- *P2035, P2055 Fuser Installation*
- *Lexmark Envelope Feeding*
- *Cartridge-Related Errors*
- *Toner-level Detection*

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EDITORIAL

Some Vendor Warning Signs

If your main vendor for laser printer parts isn't LPT, you may have noticed changes lately.

- *Warranties, previously normal, now are positively never ending.*
- *Its infrastructure, once polished and neat, has become a perpetual nightmare.*
- *Your old rep was pretty nifty, while the one you have now is plainly a novice.*

These are just a few of the signs that alien entities have taken control of your parts vendor. But what to do about it? The best thing to do is to call Liberty Parts Team at 888-444-8778 and get a quote.

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- *OEM parts for HP LaserJet and DesignJet , Lexmark, Oki and Samsung.*
- *This newsletter and our incredible website.*
- *Great free tech support.*

If you find it difficult to leave your vendor because of fond memories, it is time to face facts: they are no longer the vendor you knew. For a quote on HP LaserJet and other printer parts, please call Liberty Parts Team at 888-444-8778.

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PRINTER TECH ARTICLE

Envelope Printing with Lexmark Laser Printers

Wrinkling and poor fusing are the main difficulties when running envelopes through laser printers. HP addresses the wrinkling issue with levers that control the gap between the fuser rollers. It tackles the poor fusing problem with a user menu to increase fuser temperature.

Lexmark's approach is completely different and is the subject of this article.

Fuser temperature adjustment: Unlike HP LaserJets, Lexmark printers don't generally allow manual increase of temperature. It is unclear whether Lexmark printers automatically adjust temperature based on paper type (like some of HP's color models). In any event, make sure to define the paper type as "envelope" in the printer menus and/or driver settings (on the computer).

Pressure relief: This is only an issue on fusers with solid metal rollers. This includes the Lexmark Optra S, Optra T, and later T series printers (T520 series, T620 series, T630 series, T640 series, T650 series, etc.). All of these printers use the same scheme. There is a large solenoid in the fuser that, when it fires, opens up a small gap between the hot roller (metal) and the pressure roller (rubber). Unlike HP printers, which maintain a constant gap during the entire time that the envelope is passing through the fuser, these Lexmark models open and close the gap by repeatedly firing the solenoid (5 or 6 times)

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while the envelope is in the fuser. This scheme provides pressure relief, to prevent wrinkling, while still allowing enough pressure for good fusing. The drawback is that it makes an audible thumping sound during operation (Lexmark calls the solenoid a "thumper" in some of their service manuals).

Solenoid operation requires two things:

1 The "Envelope Enhance" feature must be turned on in the printer menu;

2 The printer must detect that an envelope is being fed. It does this by means of two sensors in the fuser. One of these sensors is triggered whenever any kind of media enters the fuser; the other one is triggered only by a full-width sheet of paper (and therefore not by an envelope).

When both of these conditions are met, the printer will fire the solenoid repeatedly until the envelope clears the fuser. Note that this allows one to run envelopes without having the solenoid fire (by turning off "Envelope Enhance") if the noise is bothersome. However, you then take the risk of envelopes wrinkling in the fuser.

It is also possible to control the magnitude of the gap between the rollers. This is done by physically adjusting a screw on the solenoid. If the toner isn't fusing well enough, you can decrease the gap; if envelopes are wrinkling, you can increase it. For each printer model, the service manual indicates what the nominal value of the gap is. This is a good starting point for adjustments. Note that there is also a "gap adjustment" in the printer menu, but this has nothing to do with the solenoid gap – it refers to the gap between one sheet of paper and the next when printing a multi-page job.

HP AND LEXMARK ENVELOPE PRINTING COMPARISON

	HP	Lexmark
Automatic?	No. Levers must be moved to the "up" position when printing envelopes, and then to the "down" position for other media.	Yes. The Lexmark system is completely automatic once "Envelope Enhance" is turned on in the menu.
Physically adjustable?	No.	Yes, the solenoid gap can be adjusted.
Temperature adjustable?	Yes, the temperature is adjustable based on media type.	Can't increase temperature for better fusing.
Quiet?	Yes.	No. There is a thumping sound when printing envelopes.

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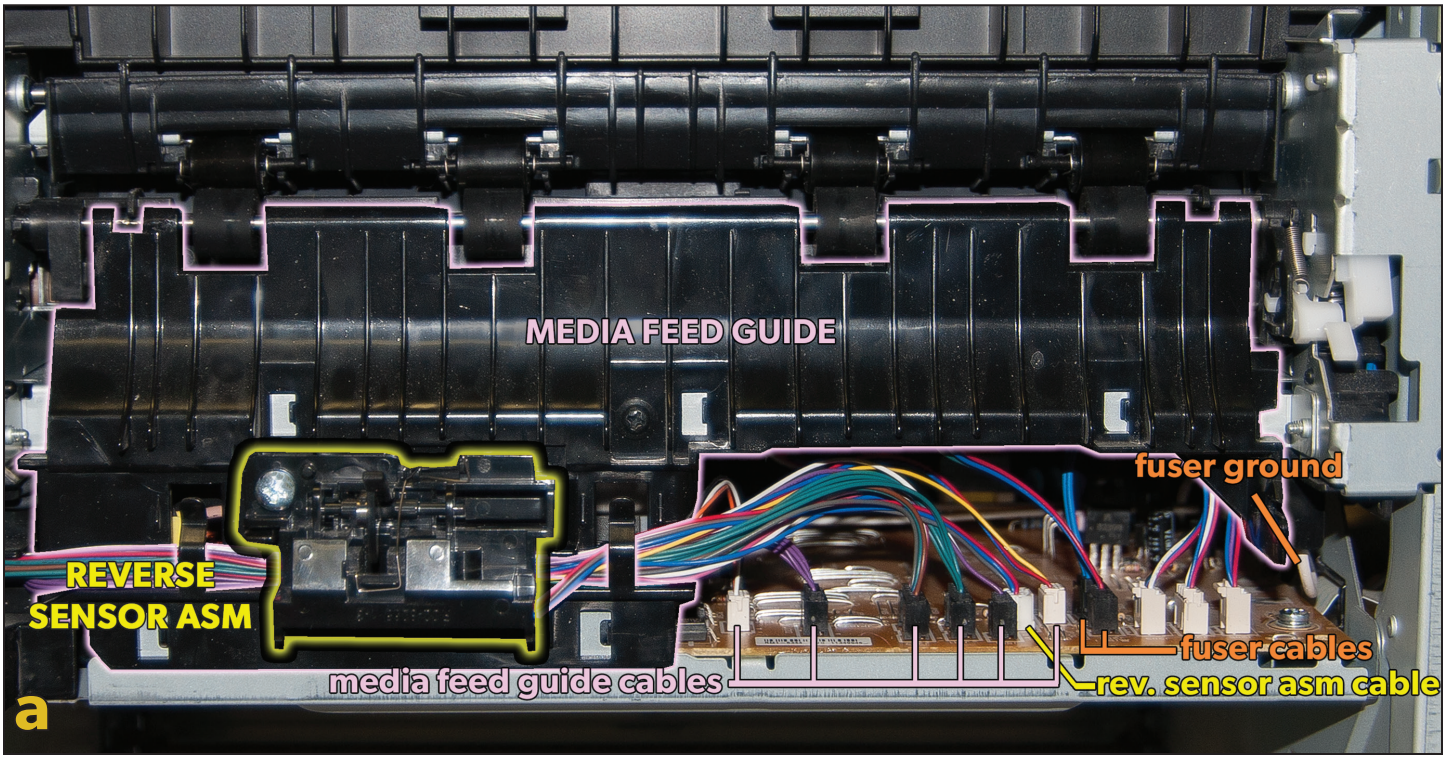
PRINTER TECH ARTICLE

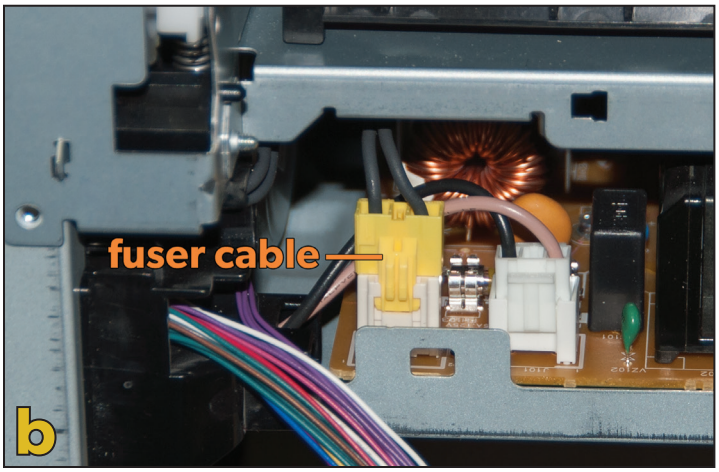
Removing the HP LJ P2035/P2055 Fuser

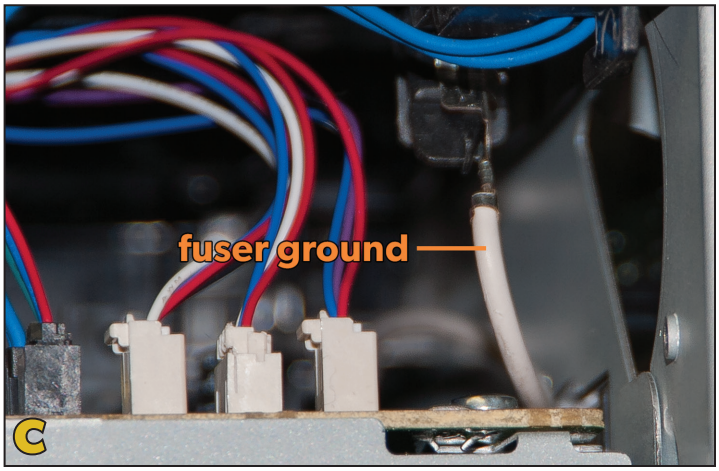
Due to ambiguity and inaccuracy in the directions given in the service manual, we've prepared the following instructions for removing the P2035/P2055 fuser.

The most important thing to remember is to keep the toner door closed after the media guide is removed. This is explained in step six. Note also that the P2035, a simplex printer, lacks a duplex paper feed assembly and a reverse sensor asm.

1 Remove the paper cassette and toner cartridge.
   a Cover the toner cartridge or put it in a dark place, as light can damage the drum.
2 Remove the right cover.
   a Open the cartridge door and the rear door.
   b Release three tabs (one at each rear corner, and one approximately in the middle of the upper edge), and slide the cover toward the front of the printer to remove it.
   c The power switch may be dislodged during this procedure. If this happens, reposition the switch before reinstalling the cover.
3 Remove the left cover.
   a With the toner door still open, gently separate the cover from the printer at each front corner, and then slide it toward the front to remove it.
4 Remove the rear cover and door
   a P2055 only: the duplex feed assembly is attached to the rear cover. Pull down on the green handle







(accessed from the front, through the paper tray cavity) to lower this assembly before removing the rear cover.

b The rest of the procedure is the same for both models. Facing the rear of the printer, remove two screws along the left edge and three screws along the right edge, release one tab in the lower left corner (directly under the power connector), and pull the cover straight out to remove it.

5 Remove the reverse sensor assembly (P2055 only):

a Unplug one connector (Fig. a), release the wires from the media feed guide, remove one screw, and then remove the assembly.

b When re-installing it, note that there are two tabs on the right that have to slide into slots in the media feed guide.

6 Remove the media feed guide.

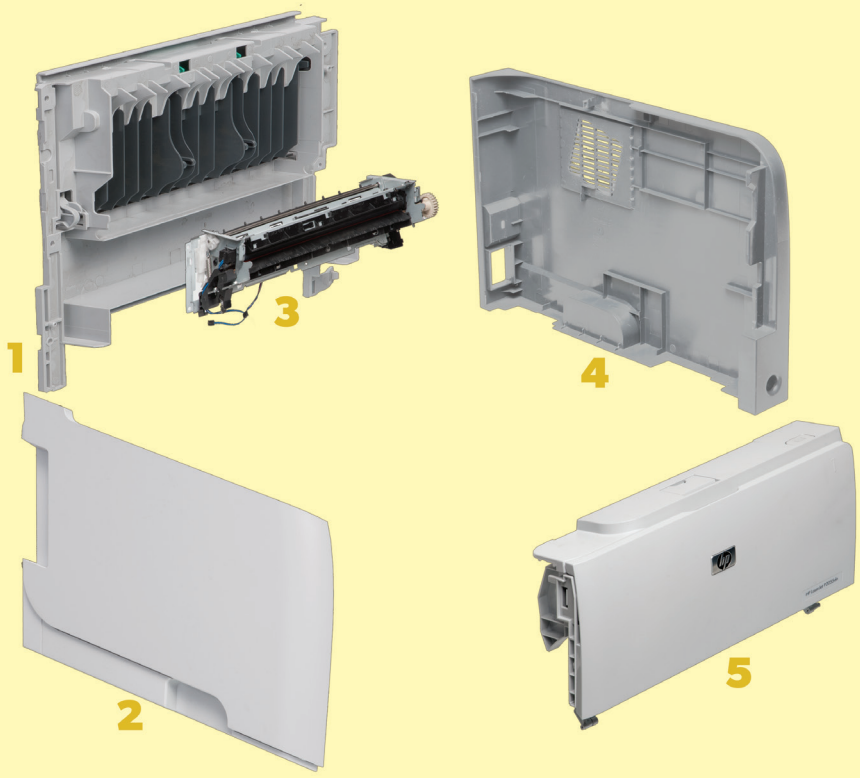
a Unplug six cables (Fig. a) and release them from the media feed guide. Then remove one screw and slide the guide to your right to remove it.

From this point on, the toner door must remain closed. *Do not open the door until after the new fuser is installed and the gears are mounted on it, or there will be fuser gear misalignment.*

7 Remove the fuser.

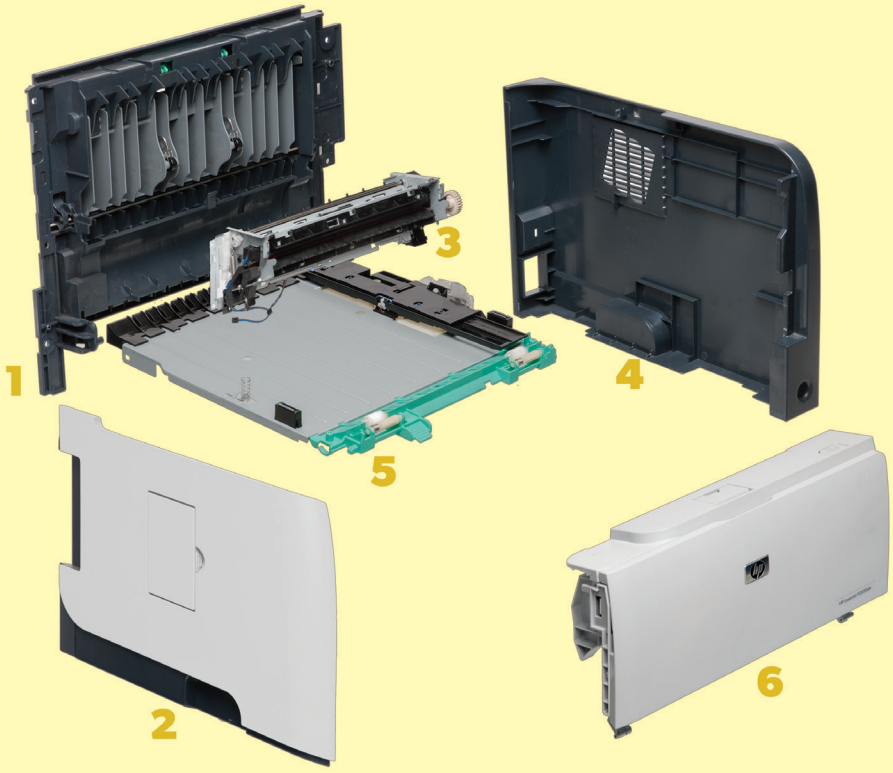
a Unplug three fuser cables (Figs. a, b) and the fuser ground connector (Fig. a, c).

b The next step is to remove three gears (Fig. d) from the end of the fuser. These will need to be transferred to the new fuser after installation. To remove gears, bend the retaining tab away from the metal shaft and then slide the gear off. The two leftmost gears are keyed so that they can only go on one way. Some care must be taken to align the rightmost gear



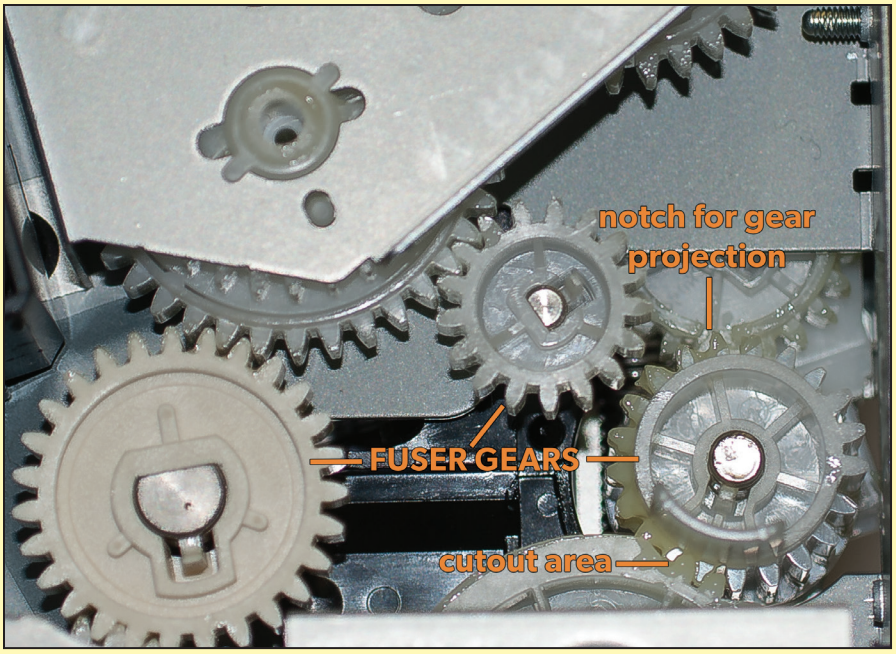
P2035

1 Rear Cover 2 Left Cover 3 Fusing Assembly 4 Right Cover 5 Cartridge Door



P2055

1 Rear Cover 2 Left Cover 3 Fusing Assembly 4 Right Cover 5 Duplexing Feed Asm 6 Cartridge Door



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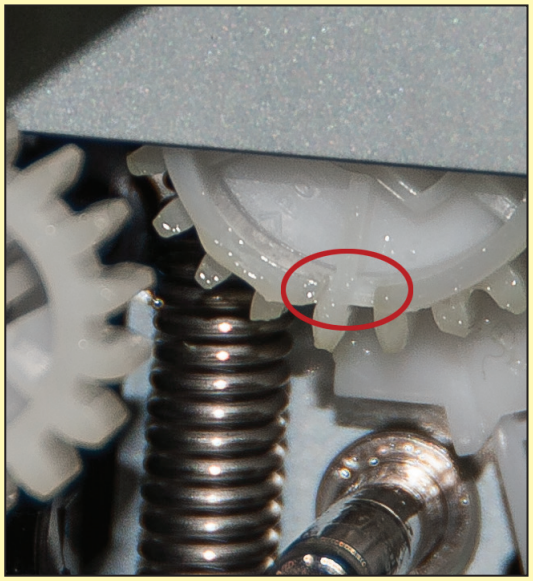
e



f

correctly. It and the gear below it each have a section where the lip is cut away (this is visible on the lower gear in Fig. d). They will only slide past each other when these sections are aligned. Also, there is a projection on the top of the gear being removed (visible in Fig. e) that fits into a notch on the gear above it (visible but perhaps hard to see in Fig. d, so we have provided a close-up in Fig. f).

c Return to the rear of the printer and remove two screws (the service manual shows three, but one of these should have already been removed with the rear cover). Then carefully pull the fuser out. It may take some manipulation to get the gear shafts through the cutouts in the metal frame, but they do fit.

8 Reverse the above procedure to install the new fuser and reassemble the printer, taking care to observe our notes.

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PRINTER TECH ARTICLE

HP LaserJet Toner Level Detection

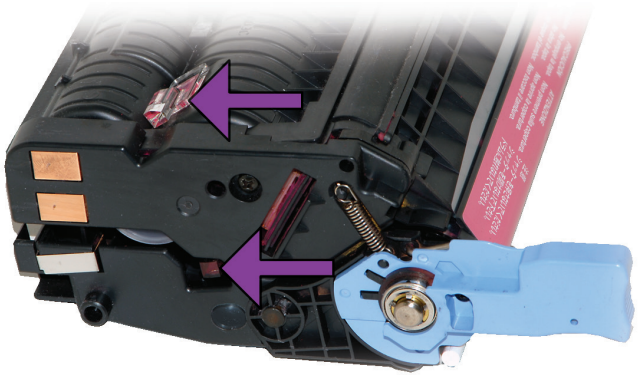
Because an adequate supply of toner is essential for proper operation of a laser printer, all printers contain mechanisms for monitoring toner usage. In this article, we will describe the monitoring methods used by HP.

There are three methods of tracking toner usage in LaserJets. Most use some combination of the three. The methods are:

1. **Electromagnetic toner sensing**. The AC bias voltage applied to the developing cylinder produces an electromagnetic field in the toner particles. The strength of this field is proportional to the amount of toner inside the cartridge. The cartridge has an internal antenna that detects the field, and the printer monitors the signal from the antenna. When it gets below a certain level, the printer knows that the toner is getting low. This method is quite accurate, but it only works with magnetic toner, and since many color toners are wax-based, electromagnetic toner sensing is used primarily on monochrome printers.

2. **Optical toner sensing.** The printer directs a light beam into the toner hopper through a window (light guide). If unblocked by toner, the light exits through an opposite window and is detected by a receiver. When the optical receiver detects light a high percentage of the time, the printer concludes that toner is low. When it is unblocked all the time, the printer concludes that the toner is out.

An upside-down 4600 toner cartridge with light guides indicated



This method works equally well for magnetic and non-magnetic toner and is used in many color printers.

3. **Page counts.** Toner cartridges are rated to print a certain number of pages at a nominal coverage of 5 percent (meaning that the page is 5 percent toner and 95 percent white space). This takes into account the amount of toner in the cartridge as well as wear and tear on the mechanical components. So the printer can also estimate the remaining life of the cartridge by keeping track of how many pages have been printed with it (this will be more or less accurate, depending on how far the print jobs stray from the nominal 5 percent coverage). Color printers usually also keep track of the number of developer and/or drum rotations, as this can differ from the number of pages printed. As with method 2, this works on all types of cartridges. However, because it is an estimate, it tends to be less accurate than methods 1 and 2, both of which more directly measure the actual amount of toner remaining.

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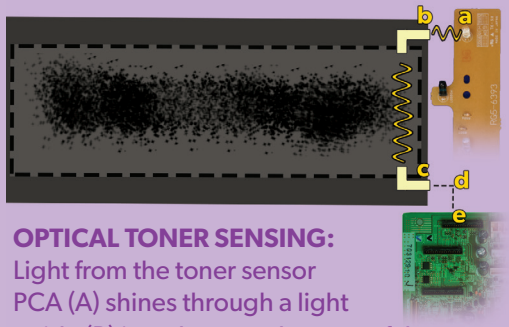
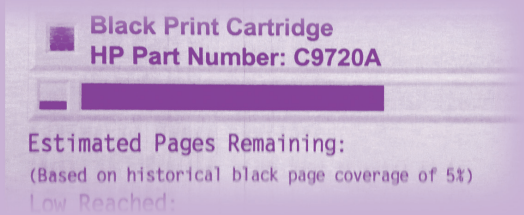
TONER DETECTION METHODS

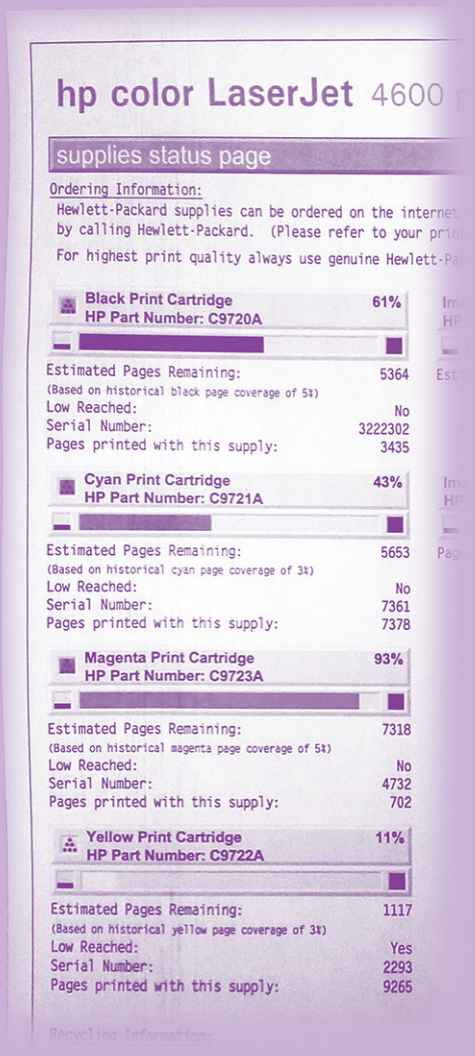
ELECTROMAGNETIC TONER SENSING: an antenna detects the electromagnetic field of the remaining toner.



OPTICAL TONER SENSING: Light from the toner sensor PCA (A) shines through a light guide (B) into the toner hopper of the cartridge. If unblocked by toner, the light reaches another light guide (C) and reaches a receiver (D). The DC controller (E) determines the toner level based the signals received.



Page Counts: a toner level estimate is made based on page counts at 5% toner coverage


hp color LaserJet 4600

supplies status page

Ordering Information:

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Black Print Cartridge 61%
HP Part Number: C9720A

Estimated Pages Remaining: 5364
(Based on historical black page coverage of 5%)
Low Reached: No
Serial Number: 3222302
Pages printed with this supply: 3435

Cyan Print Cartridge 43%
HP Part Number: C9721A

Estimated Pages Remaining: 5653
(Based on historical cyan page coverage of 3%)
Low Reached: No
Serial Number: 7361
Pages printed with this supply: 7378

Magenta Print Cartridge 93%
HP Part Number: C9723A

Estimated Pages Remaining: 7318
(Based on historical magenta page coverage of 5%)
Low Reached: No
Serial Number: 4732
Pages printed with this supply: 702

Yellow Print Cartridge 11%
HP Part Number: C9722A

Estimated Pages Remaining: 1117
(Based on historical yellow page coverage of 3%)
Low Reached: Yes
Serial Number: 2293
Pages printed with this supply: 9265

Recycling Information:

Toner Gauge

- may not be reliable with non-hp cartridges
- more accurate at the end of the cartridge's life
- it is possible to force a toner level recheck

PRINTER TECH ARTICLE

Getting an Accurate Reading from the Toner Gauge

Many laser printers have a "toner gauge" to show the approximate remaining toner life in both graphic and numerical form. It can appear either on the configuration or the supply status page. This article will show how to why the toner gauge is often inaccurate and how to get a good reading.

Why the gauge may be inaccurate

Early in the life of the cartridge, the gauge is based mostly on page counts, which can be inherently inaccurate, particularly if your toner coverage is significantly different than the 5 percent anticipated by the . The gauge becomes more accurate as the cartridge nears the end of its life, because the printer relies less on page counts and more on the electromagnetic and optical methods described in the Toner Sensing article.

Also, you cannot always trust the gauge when using a non-HP cartridge, because of possible memory tag issues. HP even goes so far as to say that "smart cartridge features (cartridge out/low) are not available" with a non-HP cartridge.

Getting a better reading

Since the printer checks the toner level and resets the gauge only at certain times, it is useful to power up with no toner cartridge(s) installed, wait for the printer to complain about this, and then install the cartridge(s). This forces the printer to check the toner level and reset the gauge.

Some printers do not automatically reset the gauge when a different cartridge is used, so you may be prompted for this information or have to go into a menu and select "New Cartridge = Yes."

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PRINTER TECH ARTICLE

Toner Error Messages: One Straightforward, Two Tricky

There are three kinds of toner-related errors in HP LaserJets. The toner low message is fairly straightforward while the other two are often misunderstood.

Toner Low

The printers have several ways of alerting the user when the toner is running low. The toner gauge, described in the previous article, is one of these. More useful and reliable are alerts via the display, which may be just lights on some models. The printer will display "toner low" message/indication when about 15 percent of capacity remains. At this point you should order a new toner cartridge, so that you have one when the next stage is reached – a "toner out" message, after which many printers will not allow you to print until a new cartridge is installed.

Since this message can be triggered either by toner levels or by page counts or rotation counts, you may or may not notice a degradation of print quality.

Install Toner Cartridge/No Toner Cartridge

When these alerts occur with a cartridge installed, it means the printer is unable to detect it; it has nothing to do with toner levels or memory tags, as some believe.

The troubleshooting steps are as follows:

a. the high voltage contacts should be checked first, as the presence of the cartridge is usually detected through them.
b. the cartridge — swap it with one that is known to work.
c. the high voltage power supply — replace it.

Supply Memory Error (10.10)

The supply memory error occurs when the printer finds the E-label/memory tag on the cartridge unreadable or unacceptable. It may or may not have a numerical error code before it – the most common numerical code is 10.10.

In most cases, you can bypass this error and still print by pressing the "Go" or "Continue" or "OK" button. On many printers, this is a green key with a "check mark" symbol.

Possible causes include:

- a defective chip, a common cause
- a non-HP toner cartridge, also a common cause
- a bad connection to the chip
- a bad dc controller board, in rare instances

People often assume this has to do with the formatter board, or a bad memory chip installed in the formatter. But it actually has nothing to do with that kind of memory.

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